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EXAMINER	
RILEY, MARCUS T	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/764,579	SAKAMOTO, YOICHI	
	Examiner	Art Unit	
	Marcus T. Riley	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) *3-5,9-11 and 15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,6-8,12-14 and 16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *attached*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is responsive to applicant's remarks received on December 17, 2007. **Claims 1, 2, 6-8, 12-14 and 16** remain pending. **Claims 3-5, 9-11 &15** have been cancelled.

Response to Arguments

2. Applicant's arguments with respect to amended **claims 1, 6-8, 12-14 &16** filed on December 17, 2007 have been fully considered but they are not persuasive.

A: Applicant's Remarks

Applicant submits, however, that nothing in Kawamoto would teach or suggest the notification means of Claim 1. Nothing in the Kawamoto system is seen to suggest "predicting coded data amounts for the respective printing color components based on [a] table designated by [ ] designation means and the sizes of halftone image areas and character/line image areas included in the image to be printed", as recited in Claim 1, much less generating memory allocation ratio information based on a ratio of such predicted coded data amounts or conveying the resulting memory allocation ratio information to a printing apparatus, as is also recited in Claim 1. For these reasons, therefore, Applicant believes that Claim 1 is allowable over Kawamoto.

Even assuming Horiuchi shows all that it is cited for, and assuming for argument's sake that the proposed combination of that patent with Kawamoto is a permissible one, the result of

the proposed combination would not contain or suggest the notification means recited in Claim 1, and therefore, Applicant believes that Claim 1 is allowable over those two patents, taken separately or in any proper combination (if any).

Independent Claims 6, 8 and 12 each contain recitations like that of the notification means in Claim 1, and are each believed to be patentable for at least the same reasons as discussed above in connection with Claim 1. In addition, independent Claim 14 is a method claim corresponding to system Claim 1, and is believed to be allowable for those same reasons.

A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as a reference against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and allowance of the present application.

A: Examiner's Response

Examiner submits, however, that Kawamoto in combination with Horiuchi teaches or suggest the notification means of Claim 1, predicting coded data amounts for the respective printing color components based on [a] table designated by designation means and the sizes of

halftone image areas and character/line image areas included in the image to be printed, and generating memory allocation ratio information based on a ratio of such predicted coded data amounts or conveying the resulting memory allocation ratio information to a printing apparatus: Kawamoto '457 discloses generating memory allocation ratio information based on a ratio of the predicted coded data amounts for the respective printing color components coded by said coding means and notifying said printing apparatus of the memory allocation ratio information (*"the digital image after being filtered by the filter 50-3 is provided to a 4-line FIFO 54-1 of the memory unit 54. The 4-line FIFO stores the digital image data corresponding to 4 lines so as to form a 4.times.4 pixel matrix. Each 4.times.4 pixel matrix is sequentially provided to an encoding unit 54-2 so as to be encoded, and the encoded data is provided to a memory 54-4 such as a DRAM via a selector A 54-3 and is stored in the memory 54-4. The data stored in the memory 54-4 is provided to a hard disc unit 58 by a transfer control unit 57. The image data transferred to the hard disc unit 58 is stored on an individual original document basis. Accordingly, the image data stored in the hard disc unit 58 can be read out on an individual original document basis."* column 7, lines 21-34). Horiuchi '275 discloses notification means for predicting coded data amounts for the respective printing color components based on the table designated by said designation means and the sizes of halftone image areas and character/line image areas included in the image to be printed (*"In the case of printing color images having half-tones and hues such as color photographs, it is necessary to be able to reproduce picture images with half-tones and hues closely similar to the original in at least sixteen steps of gradations. A drop-on-demand type of ink-jet head, whereby ink dots can be varied in size in accordance with voltages applied, is suitably used in general and is well known in this art. In*

this type of ink-jet head, ink drops are practically limited from 100 to 180.mu. in size so that images with half-tones in sufficient steps of gradation are hardly obtainable. To avoid the problem described above, it has been proposed to vary the number of ink dots appearing on a dot matrix having n possible positions in the row and m possible position in the column (n and m being integers) for one picture element so as to reproduce images with half-tones in a sufficiently large number of steps of gradation." column 1, lines 41-57). Thus, Claim 1 is not allowable over Kawamoto in combination with Horiuchi taken separately or in any proper combination.

Independent Claims 6, 8 and 12 each contain recitations like that of the notification means in Claim 1, and are not patentable for at least the same reasons as discussed above in connection with Claim 1. In addition, independent Claim 14 is a method claim corresponding to system Claim 1, and is also not allowable for those same reasons.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are not patentable for the same reasons.

Thus, Applicant's arguments with respect to amended **claims 1, 6-8, 12-14 &16** filed on December 17, 2007 have been fully considered but they are not persuasive.

Claim Rejections - 35 USC § 101

(The previous claim rejection is withdrawn in light of the applicant's amendments.)

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 1, 2, 6, 7, 8, 12-14 & 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamoto '457 (US 6,151,457, hereinafter Kawamoto '457) in combination with Horiuchi et al. (US 4,413,275 hereinafter, Horiuchi '275).

Regarding claim 1; Kawamoto '457 discloses a printing system including an information processing apparatus which outputs print data and a printing apparatus which receives the print data from said information processing apparatus, and prints a color image on a sheet, wherein said information processing apparatus comprises: generation means for generating image data for respective printing color components of an image based on data to be print-outputted delivered from higher processing (*"Each image forming apparatus includes an image scanner that scans in an original document so as to generate image data,"* column 2, line 8-10); coding means for compress-encoding the quantized image data for the respective printing color components generated by said generation means (*"...an image processing unit for processing the image data, an encoding unit to encode the processed image data..."* column 2, line 11-12); generating memory allocation ratio information based on a ratio of the predicted coded data amounts for the respective printing color components coded by said coding means and notifying said printing apparatus of the memory allocation ratio information (*"the digital image after*

being filtered by the filter 50-3 is provided to a 4-line FIFO 54-1 of the memory unit 54. The 4-line FIFO stores the digital image data corresponding to 4 lines so as to form a 4.times.4 pixel matrix. Each 4.times.4 pixel matrix is sequentially provided to an encoding unit 54-2 so as to be encoded, and the encoded data is provided to a memory 54-4 such as a DRAM via a selector A 54-3 and is stored in the memory 54-4. The data stored in the memory 54-4 is provided to a hard disc unit 58 by a transfer control unit 57. The image data transferred to the hard disc unit 58 is stored on an individual original document basis. Accordingly, the image data stored in the hard disc unit 58 can be read out on an individual original document basis." column 7, lines 21-34); and output means for outputting the image data for the respective printing color components coded by said coding means to said printing apparatus (*"The digital copy machine 110 can compress the digital image data, and the compressed image data can be transferred to other image forming apparatuses such as the digital copy machine 120 via an image transfer unit 70 while decoding the compressed digital image data so as to output an image based on the decoded digital image data."* column 7, lines 16-21); and wherein said printing apparatus comprises: plural decoding means, independently provided for the respective printing color components, for decoding coded data to image data *("...a decoding unit to decode the encoded image data stored in the memory unit, and a printing unit for printing the decoded image data."* column 2, lines 15-17).

Kawamoto '457 does not expressly disclose storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component; designation means for designing a table among the plurality of tables; and quantizing the generated image data for respective printing color components using dither

matrixes specified by the table designated by said designation means; notification means for predicting coded data amounts for the respective printing color components based on the table designated by said designation means and the sizes of halftone image areas and character/line image areas included in the image to be printed; a reception buffer to store, temporarily the image data for the respective printing color components outputted by said output means; or means for setting sizes of said reception buffer allocated for the respective printing color components, in accordance with the memory allocation ratio information.

Horiuchi '275 discloses storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component (*"Color density signals of three primary colors for each picture element stored or memorized temporarily in the line buffer memory 37 are fed to the UCR circuit 41. Yellow color density signals extracted from the UCR circuit 41 are decoded by a decoder 91 to address a table in a table memory 92 wherein dot patterns to be formed according to color densities are previously stored in the form of combinations of positions of matrix cell and dot signals (according to the voltage with which an ink-jet head is driven)."* column 10, lines 1-10); designation means for designing a table among the plurality of tables (*"A picture element with half-tone can be formed in about 30 to 70 steps of gradation depending on the variation of sizes and arrangement of ink dots to be distributed in a single dot matrix having three possible positions in both the row and the column."* column 7, lines 25-29); and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation means (*"In each of the dot pattern generators 45 to 48, the locations and sizes of the ink dots to be depicted in a dot matrix having n.times.m, for instance*

3.times.3, possible positions for constructing an image element are determined in accordance with color density signals by referring to a predetermined table. Thus the dot pattern generator 45, when a series of yellow color density signals are fed thereto, converts these into three series of yellow color dot signals. In the case of a dot matrix of 4.times.4 possible positions for an image element, a dot pattern generator for producing four series of color dot signals can be employed." column 6, lines 41-52); notification means for predicting coded data amounts for the respective printing color components based on the table designated by said designation means and the sizes of halftone image areas and character/line image areas included in the image to be printed (*"In the case of printing color images having half-tones and hues such as color photographs, it is necessary to be able to reproduce picture images with half-tones and hues closely similar to the original in at least sixteen steps of gradations. A drop-on-demand type of ink-jet head, whereby ink dots can be varied in size in accordance with voltages applied, is suitably used in general and is well known in this art. In this type of ink-jet head, ink drops are practically limited from 100 to 180.mu. in size so that images with half-tones in sufficient steps of gradation are hardly obtainable. To avoid the problem described above, it has been proposed to vary the number of ink dots appearing on a dot matrix having n possible positions in the row and m possible position in the column (n and m being integers) for one picture element so as to reproduce images with half-tones in a sufficiently large number of steps of gradation."* column 1, lines 41-57); a reception buffer to temporarily store the image data for the respective printing color components outputted by said output means (*"The color density signals masked in a CPU are stored or memorized in four line buffer memories and are then fed to a UCR circuit by which color density signals of yellow, magenta, cyan and black are generated. As a result, color density*

signals are sampled correspondingly to colors of inks to be supplied to each ink-jet head." column 2, line 68 thru column 3, lines 1-6); means for setting sizes of said reception buffer allocated for the respective printing color components, in accordance with the memory allocation ratio information (*"A color dot matrix pattern is automatically determined depending on the color density, in such a way that the positions and sizes of the ink dots to appear on a single color dot matrix are indicated, while the color density signals of each individual color are separated into three series of signals, which are fed to and memorized in buffer memories provided one for every ink-jet head, for controlling the positions and sizes of the ink drops to be ejected from the ink-jet heads. Each series of signals is after the conversion into analog signals for driving an ink-jet head, supplied to each ink-jet head."* column 3, lines 7-17).

Kawamoto '457 and Horiuchi '275 are combinable because they are from same field of endeavor of printing systems (*"The present invention relates to an ink-jet color printing apparatus for forming, that is, painting color images with several kinds of colored inks and more particularly to an apparatus which is suitable for painting color images having half tones such as a color photograph."* Horiuchi '275 at column 1, lines 5-9).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the printing apparatus as taught by Kawamoto '457 by adding storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component; designation means for designing a table among the plurality of tables; and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation

means; notification means for predicting coded data amounts for the respective printing color components based on the table designated by said designation means and the sizes of halftone image areas and character/line image areas included in the image to be printed; a reception buffer to store, temporarily the image data for the respective printing color components outputted by said output means; or means for setting sizes of said reception buffer allocated for the respective printing color components, in accordance with the memory allocation ratio information as taught by Horiuchi '275.

The motivation for doing so would have been to provide an printing apparatus to colored ink-drops from being turbid and flowing (*"The principal object of the present invention is to provide an ink-jet color printing apparatus wherein colored ink drops can be prevented from being turbid and flowing."* Horiuchi '275 at column 2, lines 12-15).

Therefore, it would have been obvious to combine Kawamoto '457 with Horiuchi '275 to obtain the invention as specified in claim 1.

Regarding claim 2; Kawamoto '457 does not expressly disclose where respective areas of said reception buffer allocated for the respective printing color components are utilized as a ring buffer.

Horiuchi '275 discloses where respective areas of said reception buffer allocated for the respective printing color components are utilized as a ring buffer (*"Signals of the color image information read out from the memory device are processed by masking by the use of a non-linear polynomial in a CPU, being converted into color density signals of primary colors, namely, yellow, magenta and cyan. The color density signals masked in a CPU are stored or*

memorized in four line buffer memories and are then fed to a UCR circuit by which color density signals of yellow, magenta, cyan and black are generated." column 2, lines 64-68 thru column 3, lines 1-4).

Kawamoto '457 and Horiuchi '275 are combinable because they are from same field of endeavor of printing systems (*"The present invention relates to an ink-jet color printing apparatus for forming, that is, painting color images with several kinds of colored inks and more particularly to an apparatus which is suitable for painting color images having half tones such as a color photograph."* Horiuchi '275 at column 1, lines 5-9).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the printing apparatus as taught by Kawamoto '457 by adding a reception buffer utilized as a ring buffer for printing color components as taught by Horiuchi '275.

The motivation for doing so would have been to provide an printing apparatus to prevent colored ink-drops from being turbid and flowing (*"The principal object of the present invention is to provide an ink-jet color printing apparatus wherein colored ink drops can be prevented from being turbid and flowing."* Horiuchi '275 at column 2, lines 12-15).

Therefore, it would have been obvious to combine Kawamoto '457 with Horiuchi '275 to obtain the invention as specified in claim 1.

Regarding claim 6; Kawamoto '457 discloses coding means for compress-encoding the quantized image data for the respective printing color components generated by said generation means (*"an image processing unit for processing the image data, an encoding unit to encode the*

processed image data…" column 2, line 11-12); generating memory allocation ratio information based on a ratio of the calculated coded data amounts for the respective printing color components and notifying said printing apparatus of the memory allocation ratio information (*"the digital image after being filtered by the filter 50-3 is provided to a 4-line FIFO 54-1 of the memory unit 54. The 4-line FIFO stores the digital image data corresponding to 4 lines so as to form a 4.times.4 pixel matrix. Each 4.times.4 pixel matrix is sequentially provided to an encoding unit 54-2 so as to be encoded, and the encoded data is provided to a memory 54-4 such as a DRAM via a selector A 54-3 and is stored in the memory 54-4. The data stored in the memory 54-4 is provided to a hard disc unit 58 by a transfer control unit 57. The image data transferred to the hard disc unit 58 is stored on an individual original document basis. Accordingly, the image data stored in the hard disc unit 58 can be read out on an individual original document basis."* column 7, lines 21-34); and output means for outputting the image data for the respective printing color components coded by said coding means to said printing apparatus (*"The digital copy machine 110 can compress the digital image data, and the compressed image data can be transferred to other image forming apparatuses such as the digital copy machine 120 via an image transfer unit 70 while decoding the compressed digital image data so as to output an image based on the decoded digital image data."* column 7, lines 16-21).

Kawamoto '457 does not expressly disclose a printing system including an information processing apparatus which outputs print data and a printing apparatus which receives the print data from said information processing apparatus and prints a color image on a sheet, wherein said information processing apparatus comprises; storage means for storing a plurality of tables

for defining a set of dither matrix patterns used for character/line image and halftone image for each color component; designation means for designating a table among the plurality of tables; a generation means for generating image data for respective printing color components of an image based on data to be print-outputted delivered from higher processing and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation means; where said notification means for calculating code data amounts for the respective printing color components by counting data amounts of the quantizied halftone image areas and the character/line image areas for the respective printing color components in accordance with the table designated by said designation means; a reception buffer to store, temporarily, the image data for the respective printing color components outputted by said output means; plural decoding means, independently provided for the respective printing color components, for decoding coded data to image data; and means for setting sizes of said reception buffer allocated for the respective printing color components, in accordance with the memory allocation ratio information.

Horiuchi '275 discloses a printing system including an information processing apparatus which outputs print data and a printing apparatus which receives the print data from said information processing apparatus and prints a color image on a sheet, wherein said information processing apparatus comprises (*"...in FIG. 1, there is schematically shown an ink-jet color printing apparatus comprising a color image information input unit 1 which reads the color information of color picture images of an original by a two-dimensional scanning of the color images and then converts them into digital signals, a color image processing unit 2 for memorizing the color image information as digital signals input from the color image*

information input unit 1 and for carrying out image processing such as masking, and a printer apparatus 3 for reproducing color pictures by ejecting colored ink-drops of a plurality of colors of inks from nozzles toward a recording medium, for instance a plain piece of paper, to form color pictures thereon." column 3, lines 55-67): storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component (*"Color density signals of three primary colors for each picture element stored or memorized temporarily in the line buffer memory 37 are fed to the UCR circuit 41. Yellow color density signals extracted from the UCR circuit 41 are decoded by a decoder 91 to address a table in a table memory 92 wherein dot patterns to be formed according to color densities are previously stored in the form of combinations of positions of matrix cell and dot signals (according to the voltage with which an ink-jet head is driven)."* column 10, lines 1-10); designation means for designating a table among the plurality of tables (*"A picture element with half-tone can be formed in about 30 to 70 steps of gradation depending on the variation of sizes and arrangement of ink dots to be distributed in a single dot matrix having three possible positions in both the row and the column."* column 7, lines 25-29); a generation means for generating image data for respective printing color components of an image based on data to be print-outputted delivered from higher processing and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation means (*"A dot pattern generator 45 to 48 is provided for each UCR circuit, with its input terminal connected with the output terminal of the latter. Consequently the dot pattern generator 45 receives only the color density signals of yellow output from the UCR circuit 41, the dot pattern generator 46 receives the color density signals of magenta output from*

the UCR circuit 42, the dot pattern generator 47 receives the color density signals of cyan output from the UCR circuit 43 and the remaining one receives the density signals of black output from the UCR circuit 44. In each of the dot pattern generators 45 to 48, the locations and sizes of the ink dots to be depicted in a dot matrix having n.times.m, for instance 3.times.3, possible positions for constructing an image element are determined in accordance with color density signals by referring to a predetermined table. Thus the dot pattern generator 45, when a series of yellow color density signals are fed thereto, converts these into three series of yellow color dot signals. In the case of a dot matrix of 4.times.4 possible positions for an image element, a dot pattern generator for producing four series of color dot signals can be employed." column 6, lines 30-52); where said notification means for calculating code data amounts for the respective printing color components by counting data amounts of the quantizied halftone image areas and the character/line image areas for the respective printing color components in accordance with the table designated by said designation means (*"In the case of printing color images having half-tones and hues such as color photographs, it is necessary to be able to reproduce picture images with half-tones and hues closely similar to the original in at least sixteen steps of gradations. A drop-on-demand type of ink-jet head, whereby ink dots can be varied in size in accordance with voltages applied, is suitably used in general and is well known in this art. In this type of ink-jet head, ink drops are practically limited from 100 to 180.mu. in size so that images with half-tones in sufficient steps of gradation are hardly obtainable. To avoid the problem described above, it has been proposed to vary the number of ink dots appearing on a dot matrix having n possible positions in the row and m possible position in the column (n and m being integers) for one picture element so as to reproduce images with half-tones in a sufficiently large number of steps*

of gradation." column 1, lines 41-57); and wherein said printing apparatus comprises: a reception buffer to store, temporarily, the image data for the respective printing color components outputted by said output means (*"The color density signals masked in a CPU are stored or memorized in four line buffer memories and are then fed to a UCR circuit by which color density signals of yellow, magenta, cyan and black are generated. As a result, color density signals are sampled correspondingly to colors of inks to be supplied to each ink-jet head."* column 2, line 68 thru column 3, lines 1-6); plural decoding means, independently provided for the respective printing color components, for decoding coded data to image data (*"...a decoding unit to decode the encoded image data stored in the memory unit, and a printing unit for printing the decoded image data."* column 2, lines 15-17); and means for setting sizes of said reception buffer allocated for the respective printing color components, in accordance with the memory allocation ratio information (*"A color dot matrix pattern is automatically determined depending on the color density, in such a way that the positions and sizes of the ink dots to appear on a single color dot matrix are indicated, while the color density signals of each individual color are separated into three series of signals, which are fed to and memorized in buffer memories provided one for every ink-jet head, for controlling the positions and sizes of the ink drops to be ejected from the ink-jet heads. Each series of signals is after the conversion into analog signals for driving an ink-jet head, supplied to each ink-jet head."* column 3, lines 7-17).

Kawamoto '457 and Horiuchi '275 are combinable because they are from same field of endeavor of printing systems (*"The present invention relates to an ink-jet color printing apparatus for forming, that is, painting color images with several kinds of colored inks and more*

particularly to an apparatus which is suitable for painting color images having half tones such as a color photograph." Horiuchi '275 at column 1, lines 5-9).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the printing apparatus as taught by Kawamoto '457 by a printing system including an information processing apparatus which outputs print data and a printing apparatus which receives the print data from said information processing apparatus and prints a color image on a sheet, wherein said information processing apparatus comprises; storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component; designation means for designating a table among the plurality of tables; a generation means for generating image data for respective printing color components of an image based on data to be print-outputted delivered from higher processing and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation means; where said notification means for calculating code data amounts for the respective printing color components by counting data amounts of the quantizied halftone image areas and the character/line image areas for the respective printing color components in accordance with the table designated by said designation means; a reception buffer to store, temporarily, the image data for the respective printing color components outputted by said output means; plural decoding means, independently provided for the respective printing color components, for decoding coded data to image data; and means for setting sizes of said reception buffer allocated for the respective printing color components, in accordance with the memory allocation ratio information as taught by Horiuchi '275.

The motivation for doing so would have been to provide an printing apparatus to prevent colored ink-drops from being turbid and flowing (*"The principal object of the present invention is to provide an ink-jet color printing apparatus wherein colored ink drops can be prevented from being turbid and flowing."* Horiuchi '275 at column 2, lines 12-15).

Therefore, it would have been obvious to combine Kawamoto '457 with Horiuchi '275 to obtain the invention as specified in claim 6.

Regarding claim 7; Kawamoto '457 discloses wherein said information process apparatus further comprises: request means for requesting status information of said reception buffer from said printing apparatus; determination means for determining whether or not next page compressed data for the respective printing color components can be stored in available areas of the reception buffer for the respective printing color components, based on the status information obtained by said request means; and control means for, if said determination means determines that the next page compressed data can be stored, deleting the memory allocation ratio information to be notified by said notification means and causing said output means to output the next page compressed data (*"Additionally, in the present embodiment, a command transfer unit 70-5 comprising a transmission buffer and a reception buffer is provided in the image transfer unit 70. The transmission buffer transmits a signal TXD to the receiver-side apparatus, and the reception buffer receives a signal RXD received from the receiver side apparatus. The signals TXD and RXD are used for transmitting control commands between the transmitter side apparatus and the receiver-side apparatus through a low-speed serial communication."* column 8, lines 17-26).

Regarding claim 8; Kawamoto '457 discloses an information processing apparatus, which is connectable to a printing apparatus in which sizes of reception buffer memory allocated for respective color components are changed in accordance with external instruction information, and which outputs print data to said printing apparatus, comprising: Kawamoto '457 discloses generation means for generating image data for respective printing color components of an image based on data to be print-outputted delivered from higher processing (*"Each image forming apparatus includes an image scanner that scans in an original document so as to generate image data,"* column 2, line 8-10); Kawamoto '457 discloses coding means for compress-encoding the quantized image data for the respective printing color components generated by said generation means (*"...an image processing unit for processing the image data, an encoding unit to encode the processed image data..."* column 2, line 11-12); generating memory allocation ratio information based on a ratio of the predicted coded data amounts for the respective printing color components coded by said coding means and notifying said printing apparatus of the memory allocation ratio information (*"the digital image after being filtered by the filter 50-3 is provided to a 4-line FIFO 54-1 of the memory unit 54. The 4-line FIFO stores the digital image data corresponding to 4 lines so as to form a 4.times.4 pixel matrix. Each 4.times.4 pixel matrix is sequentially provided to an encoding unit 54-2 so as to be encoded, and the encoded data is provided to a memory 54-4 such as a DRAM via a selector A 54-3 and is stored in the memory 54-4. The data stored in the memory 54-4 is provided to a hard disc unit 58 by a transfer control unit 57. The image data transferred to the hard disc unit 58 is stored on an individual original document basis. Accordingly, the image data stored in the hard disc unit 58 can be read out on an individual original document basis."* column 7, lines 21-34); and output

means for outputting the image data for the respective printing color components coded by said coding means to said printing apparatus (*"The digital copy machine 110 can compress the digital image data, and the compressed image data can be transferred to other image forming apparatuses such as the digital copy machine 120 via an image transfer unit 70 while decoding the compressed digital image data so as to output an image based on the decoded digital image data."* column 7, lines 16-21).

Kawamoto '457 does not expressly disclose storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component; designation means for designating a table among the plurality of tables; and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation means; notification means for predicting coded data amounts for the respective printing color components based on the table designated by said designation means and the sizes of halftone image areas and character/line image areas included in the image to be printed.

Horiuchi '275 discloses storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component (*"Color density signals of three primary colors for each picture element stored or memorized temporarily in the line buffer memory 37 are fed to the UCR circuit 41. Yellow color density signals extracted from the UCR circuit 41 are decoded by a decoder 91 to address a table in a table memory 92 wherein dot patterns to be formed according to color densities are previously stored in the form of combinations of positions of matrix cell and dot signals*

(according to the voltage with which an ink-jet head is driven).” column 10, lines 1-10); designation means for designating a table among the plurality of tables (*“A picture element with half-tone can be formed in about 30 to 70 steps of gradation depending on the variation of sizes and arrangement of ink dots to be distributed in a single dot matrix having three possible positions in both the row and the column.”* column 7, lines 25-29); and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation means (*“In each of the dot pattern generators 45 to 48, the locations and sizes of the ink dots to be depicted in a dot matrix having n.times.m, for instance 3.times.3, possible positions for constructing an image element are determined in accordance with color density signals by referring to a predetermined table. Thus the dot pattern generator 45, when a series of yellow color density signals are fed thereto, converts these into three series of yellow color dot signals. In the case of a dot matrix of 4.times.4 possible positions for an image element, a dot pattern generator for producing four series of color dot signals can be employed.”* column 6, lines 41-52); notification means for predicting coded data amounts for the respective printing color components based on the table designated by said designation means and the sizes of halftone image areas and character/line image areas included in the image to be printed (*“In the case of printing color images having half-tones and hues such as color photographs, it is necessary to be able to reproduce picture images with half-tones and hues closely similar to the original in at least sixteen steps of gradations. A drop-on-demand type of ink-jet head, whereby ink dots can be varied in size in accordance with voltages applied, is suitably used in general and is well known in this art. In this type of ink-jet head, ink drops are practically limited from 100 to 180.mu. in size so that images with half-tones in sufficient steps*

of gradation are hardly obtainable. To avoid the problem described above, it has been proposed to vary the number of ink dots appearing on a dot matrix having n possible positions in the row and m possible position in the column (n and m being integers) for one picture element so as to reproduce images with half-tones in a sufficiently large number of steps of gradation." column 1, lines 41-57).

Kawamoto '457 and Horiuchi '275 are combinable because they are from same field of endeavor of printing systems (*"The present invention relates to an ink-jet color printing apparatus for forming, that is, painting color images with several kinds of colored inks and more particularly to an apparatus which is suitable for painting color images having half tones such as a color photograph."* Horiuchi '275 at column 1, lines 5-9).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the printing apparatus as taught by Kawamoto '457 by adding storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component; designation means for designating a table among the plurality of tables; and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation means; notification means for predicting coded data amounts for the respective printing color components based on the table designated by said designation means and the sizes of halftone image areas and character/line image areas included in the image to be printed as taught by Horiuchi '275.

The motivation for doing so would have been to provide an printing apparatus to prevent colored ink-drops from being turbid and flowing (*"The principal object of the present invention is to provide an ink-jet color printing apparatus wherein colored ink drops can be prevented from being turbid and flowing."* Horiuchi '275 at column 2, lines 12-15).

Therefore, it would have been obvious to combine Kawamoto '457 with Horiuchi '275 to obtain the invention as specified in claim 8.

Regarding claim 12; Kawamoto '457 discloses a information processing apparatus which is connectable to a printing apparatus in which sizes of reception buffer memory allocated for respective color components are changed in accordance with external instruction information, and which outputs print data to said printing apparatus, comprising: generation means for generating image data for respective printing color components of an image based on data to be print-outputted delivered from higher processing (*"Each image forming apparatus includes an image scanner that scans in an original document so as to generate image data,"* column 2, line 8-10); coding means for compress-encoding the quantized image data for the respective printing color components generated by said generation means (*"an image processing unit for processing the image data, an encoding unit to encode the processed image data..."* column 2, line 11-12); generating memory allocation ratio information based on a ratio of the calculated coded data amounts for the respective printing color components and said printing apparatus of notifying the memory allocation ratio information (*"the digital image after being filtered by the filter 50-3 is provided to a 4-line FIFO 54-1 of the memory unit 54. The 4-line FIFO stores the digital image data corresponding to 4 lines so as to form a 4.times.4 pixel matrix. Each 4.times.4 pixel matrix*

is sequentially provided to an encoding unit 54-2 so as to be encoded, and the encoded data is provided to a memory 54-4 such as a DRAM via a selector A 54-3 and is stored in the memory 54-4. The data stored in the memory 54-4 is provided to a hard disc unit 58 by a transfer control unit 57. The image data transferred to the hard disc unit 58 is stored on an individual original document basis. Accordingly, the image data stored in the hard disc unit 58 can be read out on an individual original document basis." column 7, lines 21-34); and output means for outputting the image data for the respective printing color components coded by said coding means to said printing apparatus (*"The digital copy machine 110 can compress the digital image data, and the compressed image data can be transferred to other image forming apparatuses such as the digital copy machine 120 via an image transfer unit 70 while decoding the compressed digital image data so as to output an image based on the decoded digital image data."* column 7, lines 16-21).

Kawamoto '457 does not expressly disclose storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component; designation means for designating a table among the plurality of tables; and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation means; where said notification means for calculating code data amounts for the respective printing color components by counting data amounts of the quantized halftone image areas and character/line image areas for the respective printing color components in accordance with the table designated by said designation means.

Horiuchi '275 discloses storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component (*"Color density signals of three primary colors for each picture element stored or memorized temporarily in the line buffer memory 37 are fed to the UCR circuit 41. Yellow color density signals extracted from the UCR circuit 41 are decoded by a decoder 91 to address a table in a table memory 92 wherein dot patterns to be formed according to color densities are previously stored in the form of combinations of positions of matrix cell and dot signals (according to the voltage with which an ink-jet head is driven)."* column 10, lines 1-10); designation means for designating a table among the plurality of tables (*"A picture element with half-tone can be formed in about 30 to 70 steps of gradation depending on the variation of sizes and arrangement of ink dots to be distributed in a single dot matrix having three possible positions in both the row and the column."* column 7, lines 25-29); and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation means (*"In each of the dot pattern generators 45 to 48, the locations and sizes of the ink dots to be depicted in a dot matrix having n.times.m, for instance 3.times.3, possible positions for constructing an image element are determined in accordance with color density signals by referring to a predetermined table. Thus the dot pattern generator 45, when a series of yellow color density signals are fed thereto, converts these into three series of yellow color dot signals. In the case of a dot matrix of 4.times.4 possible positions for an image element, a dot pattern generator for producing four series of color dot signals can be employed."* column 6, lines 41-52); where said notification means for calculating code data amounts for the respective printing color components by counting data amounts of the quantized

halftone image areas and character/line image areas for the respective printing color components in accordance with the table designated by said designation means; (*"In the case of printing color images having half-tones and hues such as color photographs, it is necessary to be able to reproduce picture images with half-tones and hues closely similar to the original in at least sixteen steps of gradations. A drop-on-demand type of ink-jet head, whereby ink dots can be varied in size in accordance with voltages applied, is suitably used in general and is well known in this art. In this type of ink-jet head, ink drops are practically limited from 100 to 180.mu. in size so that images with half-tones in sufficient steps of gradation are hardly obtainable. To avoid the problem described above, it has been proposed to vary the number of ink dots appearing on a dot matrix having n possible positions in the row and m possible position in the column (n and m being integers) for one picture element so as to reproduce images with half-tones in a sufficiently large number of steps of gradation."* column 1, lines 41-57).

Kawamoto '457 and Horiuchi '275 are combinable because they are from same field of endeavor of printing systems (*"The present invention relates to an ink-jet color printing apparatus for forming, that is, painting color images with several kinds of colored inks and more particularly to an apparatus which is suitable for painting color images having half tones such as a color photograph."* Horiuchi '275 at column 1, lines 5-9).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the printing apparatus as taught by Kawamoto '457 by adding storage means for storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component; designation means for designating a table

among the plurality of tables; and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated by said designation means; where said notification means for calculating code data amounts for the respective printing color components by counting data amounts of the quantized halftone image areas and character/line image areas for the respective printing color components in accordance with the table designated by said designation means as taught by Horiuchi '275.

The motivation for doing so would have been to provide an printing apparatus to prevent colored ink-drops from being turbid and flowing (*"The principal object of the present invention is to provide an ink-jet color printing apparatus wherein colored ink drops can be prevented from being turbid and flowing."* Horiuchi '275 at column 2, lines 12-15).

Therefore, it would have been obvious to combine Kawamoto '457 with Horiuchi '275 to obtain the invention as specified in claim 12.

Regarding claim 13; Kawamoto '457 discloses request means for requesting status information of said reception buffer to said printing apparatus; determination means for determining whether or not next page compressed data for the respective printing color components can be stored in available areas of the reception buffer for the respective printing color components, based on the status information obtained by said request means; and control means for, if said determination means determines that the next page compressed data can be stored, deleting the memory allocation ratio information to be notified by said notification means and causing said output means to output the next page compressed data (*"Additionally, in the present embodiment, a command transfer unit 70-5 comprising a transmission buffer and a*

reception buffer is provided in the image transfer unit 70. The transmission buffer transmits a signal TXD to the receiver-side apparatus, and the reception buffer receives a signal RXD received from the receiver side apparatus. The signals TXD and RXD are used for transmitting control commands between the transmitter side apparatus and the receiver-side apparatus through a low-speed serial communication." column 8, lines 17-26).

Regarding claim 14; Kawamoto '457 discloses a control method for an information processing apparatus, which is connectable to a printing apparatus in which sizes of reception buffer memory allocated for respective color components are changed in accordance with external instruction information, and which outputs print data to printing apparatus, said method comprising: a generation step of generating image data for respective printing color components of an image based on data to be print-outputted delivered from higher processing (*"Each image forming apparatus includes an image scanner that scans in an original document so as to generate image data,"* column 2, line 8-10); a coding step of compress-encoding the quantized image data for the respective printing color components generated at said generation step (*"...an image processing unit for processing the image data, an encoding unit to encode the processed image data..."* column 2, lines 11-12); generating memory allocation ratio information based on a ratio of the predicted coded data amounts for the respective printing color components coded at said coding step and notifying the printing apparatus of the memory allocation ratio information (*"...the digital image after being filtered by the filter 50-3 is provided to a 4-line FIFO 54-1 of the memory unit 54. The 4-line FIFO stores the digital image data corresponding to 4 lines so as to form a 4.times.4 pixel matrix. Each 4.times.4 pixel matrix is sequentially provided to an encoding unit 54-2 so as to be encoded, and the encoded data is provided to a memory 54-4 such*

as a DRAM via a selector A 54-3 and is stored in the memory 54-4. The data stored in the memory 54-4 is provided to a hard disc unit 58 by a transfer control unit 57. The image data transferred to the hard disc unit 58 is stored on an individual original document basis. Accordingly, the image data stored in the hard disc unit 58 can be read out on an individual original document basis." column 7, lines 21-34); and an output step of outputting the image data for the respective printing color components coded at said coding step to the printing apparatus (*"The digital copy machine 110 can compress the digital image data, and the compressed image data can be transferred to other image forming apparatuses such as the digital copy machine 120 via an image transfer unit 70 while decoding the compressed digital image data so as to output an image based on the decoded digital image data."* column 7, lines 16-21).

Kawamoto '457 does not expressly discloses a storing step of storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component; a designation step of designating a table among the plurality of tables; and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated in said designation step; a notification step of predicting coded data amounts for the respective printing color components based on the table designated in said designation step and the sizes of halftone image areas and character/line image areas included in the image to be printed.

Horiuchi '275 discloses a storing step of storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component

(*"Color density signals of three primary colors for each picture element stored or memorized temporarily in the line buffer memory 37 are fed to the UCR circuit 41. Yellow color density signals extracted from the UCR circuit 41 are decoded by a decoder 91 to address a table in a table memory 92 wherein dot patterns to be formed according to color densities are previously stored in the form of combinations of positions of matrix cell and dot signals (according to the voltage with which an ink-jet head is driven)."* column 10, lines 1-10); a designation step of designating a table among the plurality of tables (*"A picture element with half-tone can be formed in about 30 to 70 steps of gradation depending on the variation of sizes and arrangement of ink dots to be distributed in a single dot matrix having three possible positions in both the row and the column."* column 7, lines 25-29); and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated in said designation step (*"In each of the dot pattern generators 45 to 48, the locations and sizes of the ink dots to be depicted in a dot matrix having n.times.m, for instance 3.times.3, possible positions for constructing an image element are determined in accordance with color density signals by referring to a predetermined table. Thus the dot pattern generator 45, when a series of yellow color density signals are fed thereto, converts these into three series of yellow color dot signals. In the case of a dot matrix of 4.times.4 possible positions for an image element, a dot pattern generator for producing four series of color dot signals can be employed."* column 6, lines 41-52); a notification step of predicting coded data amounts for the respective printing color components based on the table designated in said designation step and the sizes of halftone image areas and character/line image areas included in the image to be printed (*"In the case of printing color images having half-tones and hues such as color photographs, it is necessary to be*

able to reproduce picture images with half-tones and hues closely similar to the original in at least sixteen steps of gradations. A drop-on-demand type of ink-jet head, whereby ink dots can be varied in size in accordance with voltages applied, is suitably used in general and is well known in this art. In this type of ink-jet head, ink drops are practically limited from 100 to 180.mu. in size so that images with half-tones in sufficient steps of gradation are hardly obtainable. To avoid the problem described above, it has been proposed to vary the number of ink dots appearing on a dot matrix having n possible positions in the row and m possible position in the column (n and m being integers) for one picture element so as to reproduce images with half-tones in a sufficiently large number of steps of gradation." column 1, lines 41-57).

Kawamoto '457 and Horiuchi '275 are combinable because they are from same field of endeavor of printing systems (*"The present invention relates to an ink-jet color printing apparatus for forming, that is, painting color images with several kinds of colored inks and more particularly to an apparatus which is suitable for painting color images having half tones such as a color photograph."* Horiuchi '275 at column 1, lines 5-9).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the printing apparatus as taught by Kawamoto '457 by adding a storing step of storing a plurality of tables for defining a set of dither matrix patterns used for character/line image and halftone image for each color component; a designation step of designating a table among the plurality of tables; and quantizing the generated image data for respective printing color components using dither matrixes specified by the table designated in said designation step; a notification step of predicting coded data amounts for the respective printing color

components based on the table designated in said designation step and the sizes of halftone image areas and character/line image areas included in the image to be printed as taught by Horiuchi '275.

The motivation for doing so would have been to provide an printing apparatus to prevent colored ink-drops from being turbid and flowing (*"The principal object of the present invention is to provide an ink-jet color printing apparatus wherein colored ink drops can be prevented from being turbid and flowing."* Horiuchi '275 at column 2, lines 12-15).

Therefore, it would have been obvious to combine Kawamoto '457 with Horiuchi '275 to obtain the invention as specified in claim 14.

Regarding claim 16; Kawamoto '457 as modified does not expressly discloses a computer-readable storage medium holding the printer driver program.

Horiuchi '275 discloses a computer-readable medium that stores a computer program for causing a computer to implement the method (*"A conventional mini-computer can be employed as the CPU described above for controlling the color image information input unit 1 and printer 3, for controlling the memorizing or reading out of the color image information, and for carrying out the various image processings."* column 5, lines 30-35).

Kawamoto '457 and Horiuchi '275 are combinable because they are from same field of endeavor of printing systems (*"The present invention relates to an ink-jet color printing apparatus for forming, that is, painting color images with several kinds of colored inks and more*

particularly to an apparatus which is suitable for painting color images having half tones such as a color photograph." Horiuchi '275 at column 1, lines 5-9).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the printing apparatus as taught by Kawamoto '457 by adding a computer-readable medium that stores a computer program for causing a computer to implement the method as taught by Horiuchi '275.

The motivation for doing so would have been to provide a printing apparatus which is simple in structure and which does not need a large scale time delaying circuit. (*"A further object of the present invention is to provide an ink-jet color printing apparatus which is simple in structure and which does not need a large scale time delaying circuit."* Horiuchi '275 at column 2, lines 16-19).

Therefore, it would have been obvious to combine Kawamoto '457 with Horiuchi '275 to obtain the invention as specified in claim 14.

Conclusion

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARCUS T. RILEY whose telephone number is (571)270-1581. The examiner can normally be reached on Monday - Friday, 7:30-5:00, est.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Twyler L. Haskins can be reached on 571-272-7406. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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3/15/08